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ABSTRACT

When phonetic science is extended from an individual to a dyadic system base, it acquires relevance to intercultural communication. A study examining the ability of sixteen Japanese American bilingual communicators to be understood in a situation of stressful audial interference establishes the upper limit for training in pronunciation. An approach designed to modify the dialect of college-age adults living in a multilingual community is also based on the dyadic model. Characterization of the patterns of intercultural communication in terms of dyadic phonetic patterns, such as time-imbalance, switching pause, and mismatch analysis, provides a focus for more detailed analysis of international relationships. As phonetic science becomes important to intercultural communication, it assumes the potential for making contributions to worldwide communication needs. (KS)

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PHONETIC SCIENCE, INTERCULTURAL COMMUNICATION AND THE RIGHT OF MAN TO COMMUNICATE

by L.S. Harms*

INTRODUCTION

In his long and distinguished career, Professor Masao Onishi has made many contributions to phonetic science. I would like to focus on one of these. In building on the international tradition begun by Paul Passy and continued by Daniel Jones and others, Professor Onishi has made an important contribution, as I have previously noted (10), to the broadening of the scope of phonetic science. My effort in this article has a similar purpose. Toward that end, I will employ materials both published and unpublished generated by myself and a number of collaborators over the past decade.

My basic premise is that phonetic science has been and will continue to be a world science as reflected in organizations such as the World Congress of Phoneticians, the International Phonetic Association, and the International Society for Phonetic Sciences and as documented in its application to a number of world problems. A second premise is that many of the basic findings of phonetic science are applied by students around the world when they learn a second language. Importantly, when a person has learned a second language, he becomes able

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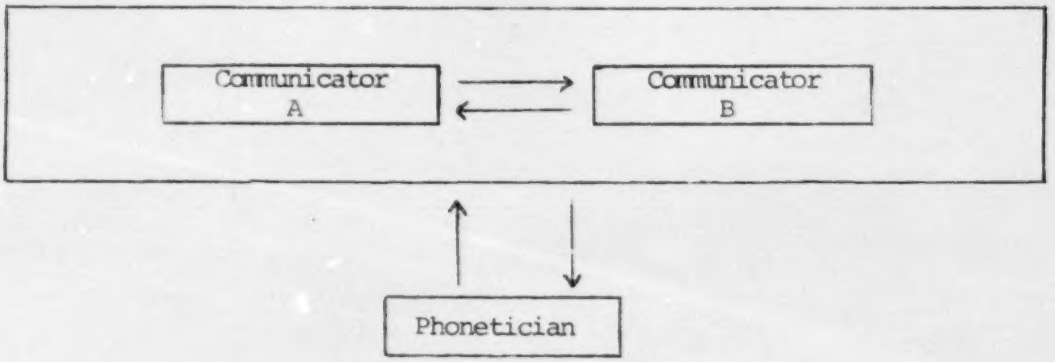
to communicate with persons who differ in language and culture from himself. Because of the close relationship between communication and human development, the opportunity to engage in intercultural communication is of such great importance that it is one of the central concerns of the United Nations. That concern is most elegantly expressed in the simple phrase, "Everyone has the Right to Communicate."

Phonetic science, then, makes a direct contribution to the growth of intercultural communication. In turn, intercultural communication makes possible a worldwide Right to Communicate.

Up to now, research in phonetic science has focused on the speech output of an isolated and single speaker. As phonetic science seeks to make a major contribution to intercultural communication, it becomes necessary to study two persons as they engage in communication. A general model for two-person dyadic intercultural communication is presented below in Figure 1 and has been discussed in detail in a number of publications (6, 7, 9, 11, 12, 13). Note that the phonetician observes and describes the interaction between the two speakers or communicators. Thus, instead of studying only the speech of a single "informant," he studied the joint speech output of two persons engaged in conversation, dialog, or more generally, intercultural communication.

Fig. 1. Dyadic Communication System



The remainder of this article is divided into three major sections. The first of these extends phonetic science from a one-person to a two-person or dyadic model. The second section focuses on purposeful dyadic intercultural communication where one communicator speaks his native language and the other a second language. The third section examines the contribution phonetic science can make to the Right of Man to Communicate. The paper concludes with a short summary.

DYADIC PHONETIC SCIENCE

In this section three examples of dyadic phonetic science and application are included. The first example is of intercultural word intelligibility, the second of a training program, and the third of a testing procedure.

Word intelligibility has been defined by Black (2) and others as the match between the word spoken by Communicator A and the word heard by Communicator B. The match between the word Communicator A speaks and the word Communicator B hears can be measured in several ways.

The most usual procedure for determining word intelligibility is this:

- Communicator A looks at his word list and pronounces a word;
- Communicator B writes down the word he hears.

This is called the "write down" procedure. Another procedure operates in this way:

- Communicator A looks at his word list and pronounces a word;
- Communicator B looks at his answer list and chooses from four similar words the one word Communicator A actually pronounced.

This procedure is called a multiple choice intelligibility test.

The procedure employed in this study is a variation on the basic intelligibility testing procedure:

- Communicator A and B both see a concept word presented to them on a 5x8 card;
- Communicator A "thinks of a word" and pronounces it;
- Communicator B repeats out loud the word pronounced by A; and, he in turn "thinks of a word" and pronounces it;
- Communicator A repeats . . .

A and B continue pronouncing and repeating words for one minute. Most communicator pairs (A and B) pronounce and repeat an average of 14 different words per concept per minute. Thus a "concept/minute" is the equivalent of approximately 14 words.

In this study, each communicator pair worked one time with the eight different concept words: Pride, Faith, Hunger, Economy, Society, School, Money and Family. These words are intended to represent main areas of human life regardless of culture.

Each communicator pair used each of the eight concept words for one minute. They also used the concept in both Japanese and English. Each pair pronounced and heard words for eight minutes in Japanese and eight minutes in English, or for a total of sixteen minutes.

A total of sixteen communicators participated in the study. All were advanced students at the University of Hawaii. Eight were native Japanese and eight were native Americans. There were equal numbers of males and females in the Japanese and American groups.

All sixteen of the communicators were Japanese/English bilinguals. All were judged to be skilled communicators.

The communicators worked under an amount of stress equal to or greater than that observed, for instance, at an airport. Recorded white noise was played at a level loud enough to be judged by the communicators as interfering with their task. Recording equipment and timing devices were visible. The study was conducted along the lines suggested for testing monosyllabic word intelligibility; the environmental noise was, however, severe enough to make communication realistically difficult. Even under these unfavorable conditions, the communicators achieved a very high level of word intelligibility.

Under the conditions of this study, each communicator communicated for sixteen minutes in a same culture pair (Japanese/Japanese, or American/American) and for sixteen minutes in an intercultural pair (Japanese/American).

The questions of interest relate to the accuracy of word intelligibility under these conditions.

Table I shows that the same culture communicator pairs made slightly fewer intelligibility errors than did intercultural pairs. The difference, however, is not statistically significant.

Table I

	Same Culture Communicator Pairs	Intercultural Communicator Pairs
Total Number of Pairs	64	64
Mean Number of Errors Per Concept/Minute	.6	.7

Table II displays the same information in slightly greater detail. Note that J. stands for Japanese, A. for American, and E. for English. The error rate is very low. Again, there are no statistically significant findings. The findings show that in about two out of every three concept/minute trials, one error was made per trial.

Table II

Communicator Pairs

	J/J in J	J/J in E	J/A in J	J/A in E	A/A in J	A/A in E
Mean Number of Errors Per Concept/Minute	10	1.0	.6	.8	.4	.9

In summary, under the difficult condition of this study, the sixteen communicators performed very well. They performed well in same culture pairs and in intercultural pairs. They performed well in their first and in their second languages. The study illustrates how accurate bilingual communicators can become. These findings serve, therefore, to identify an upper limit for training in pronunciation.

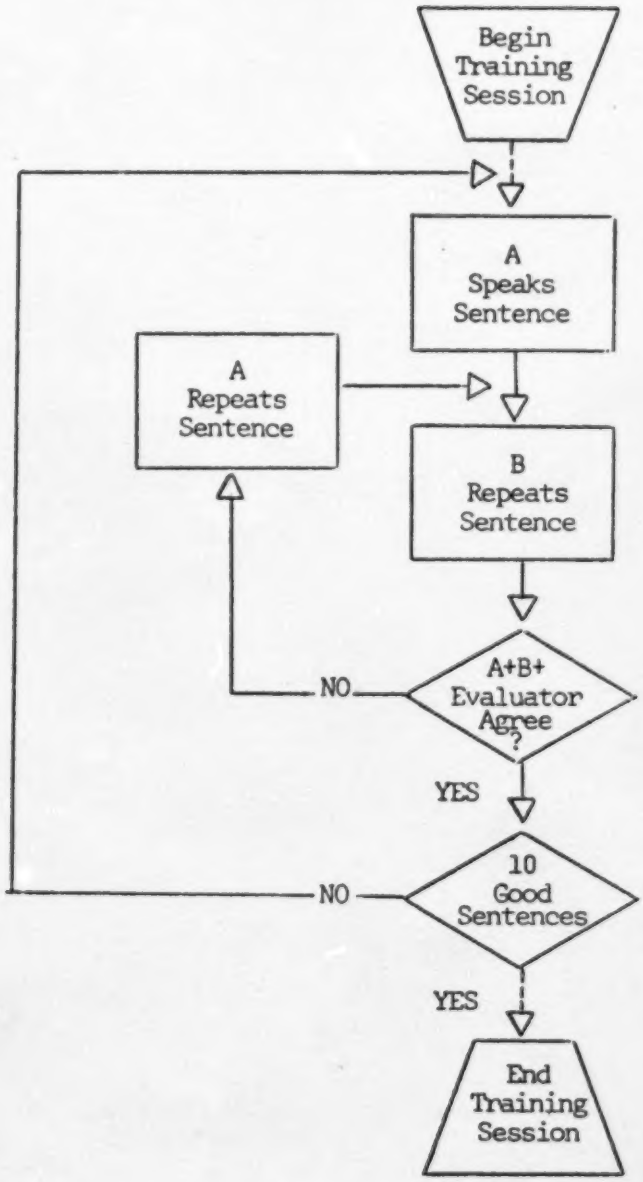
The study also suggests that a Japanese speaker of English who is highly intelligible for several other Japanese speakers of English is also likely to be highly intelligible for American speakers of English as well (20).

A training approach has been developed on a dyadic model that makes extensive use of phonetic data. The system was designed to modify the dialect of the young college-age adult living in a multi-lingual community. Each student prepares a word list of vocabulary items in his major field of study. He produces sentences of ten words (plus or minus two words) using three words from his list.

The sequence of learning activities is shown in Figure 2. Notice that Communicator A produces a sentence. If he does not consider what he hears to be a good sentence, Communicator B asks A to reproduce it. Otherwise, B repeats the sentence in all its details. Evaluator C observes the sentence A produces and that B repeats. If he hears the same good sentence twice, he signals A to produce the next sentence. If he does not hear the same good sentence twice, he asks A to resay the sentence. This process continues, until ten good sentences in sequence are produced and repeated without the need for recycling, or until fifteen minutes elapse. When the ten-sentence criterion is reached, or fifteen minutes elapse, A, B, and the Evaluator shift roles. Different students are assembled during different learning sessions.

The first unit in the Learning System, as briefly described above, rests on a careful foundation of phonetic data. Other units in the Learning System build on the same general pattern of produce, repeat and evaluate. Students before work in the learning system are rated by judges as speaking a sub-standard English and they are rated after training by the same or similar judges as speaking a standard English. While the basic developmental work on the training program utilized dialect level differences, the training system has also been used for intercultural communication (12, 15).

Figure 2. Training Sequence



A dyadic system approach to human communication leads on to novel developments in testing. Language-based tests of phonetic details employ a trained judge or rely on the anlaysis of phonetic dotials of pronunciation. In both cases, the assessment depends on a standard external to the speaker-evaluator dyad operating as a communication system. The approach reported here relies on a direct measurement procedure.

The basic data-gathering operation is shown in Table III.

Table III

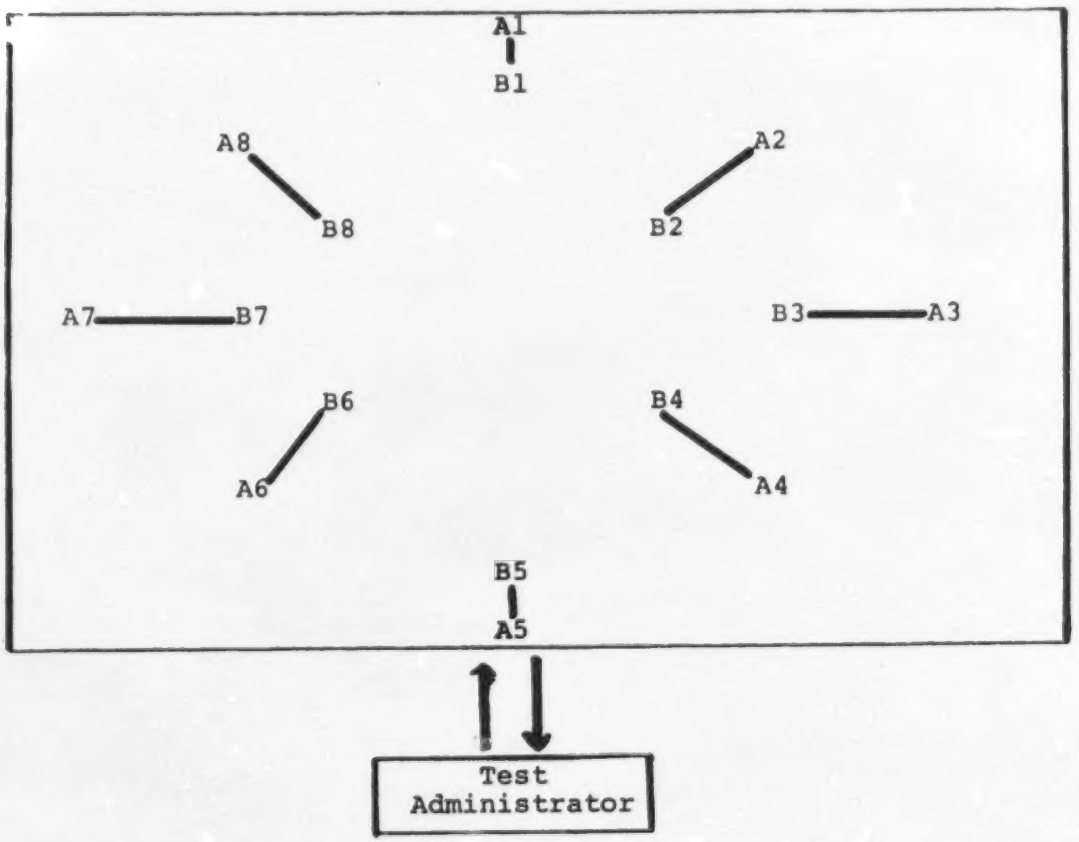
Communicator A	Communicator B
° 0 cat	0 cat
0 ran	° 0 can
° 0 thin	0 tin
0	° 0 ...
.	.
.	.
	.

The dot cues Communicator A to speak the word; B signals whether the word on his list is the same or different. If the words are the same, both A and B black in the mark-sense bubble. If the words are different, neither A or B marks. Next, B speaks a word, and A signals. Both mark same; neither marks different. On any card, there are a possible twenty such exchanges. The time alloted for completion makes it unlikely that any AB dyad finished all twenty test items.

Each communicator has eight "phonetic data" cards. Each communicator forms a dyad with eight different communicators

in the manner illustrated by Figure 3. All test instructions are presented on tape. The tape serves also to time the dyads. The test items are printed on mark-sense data cards. These cards can be hand scored, machine-punched or optically read onto computer tape. Computer programs have been prepared to score and to perform a variety of analyses on the data.

Fig. 3. Seating Chart for Hawaii Communication Test



The "phonetic data" operations described above form the first sub-test of the Hawaii Communication Test. In line with General Systems notions, the other subtests are built on this same model. The other four subtests include sentence processing,

information transfer, affect, and joint problem solving. The complete test takes about fifty minutes. The phonetic subtest, in particular, draws heavily on findings from phonetics, and it also promises to contribute data that will in the future have strong bearing on phoneme theory, and other topics of interest in modern science of phonetics (3,9).

INTERCULTURAL COMMUNICATION

Intercultural communication is usually defined as purposeful communication engaged in by participants of dissimilar cultural background. The difference in culture is reflected in dialect or native language. Appropriately, the International Phonetic Alphabet was first developed as a means of recording the details of pronunciation. While the term intercultural communication was not in use at that time, quite clearly the thrust of IPA was to facilitate the learning of a language toward the end of making communication possible between persons of dissimilar language and cultural backgrounds.

Even when the findings of phonetic science are systematically applied to the design of training materials, it takes several hundred hours for a person to master a foreign language. Curiously, many persons who invest that amount of time in the mastery of a foreign language seldom, if ever, converse with a native speaker of that language or, in other words, use the second language in intercultural communication. On the other hand, a few persons almost as they begin foreign language study seek out persons who speak that language natively and

engage in a rudimentary form of intercultural communication. Sometime ago, we became interested in why, given the often enormous difficulties involved, persons attempt to engage in intercultural communication.

In our attempt to answer the question of "why engage in intercultural communication?", we began a series of informal studies. These little studies probed a variety of areas, most of them not yet in the main stream of phonetic science. We began with basic phonetic science methodology, reviewed the psychophysics on which it is based, and incorporated the perspective and techniques of modern system theory (1, 17, 9, 13). Thus, the approach outlined here can be called a communication system approach. Rather than study the individual or an isolated "informant," we chose the dyadic system as the basic unit. Sometime after we had done so, we discovered a body of work by Jaffe (16) conducted at a microphonetic level and observation by Roman Jakobson that seemed to support our choice. A bit later we came to understand the system concepts of synergy and serendipity and appreciated better "why" persons engage in intercultural communication. Synergy is concerned with the output of a system that is greater than would be predicted from the sum of its separate parts, and serendipity is an attitude that views errors as potential information (7).

A fundamental postulate of system science is that all systems are interrelated. It follows that a simple system can be studied to help explain a complex system. Thus, some of the systems and subsystems that have been well studied in phonetic

science can be used to explain, in part, some of the more complex systems of intercultural communication. In particular most of the phonetic research in word and sentence intelligibility and some of the phonetic research in language learning can be brought to bear on questions of intercultural communication. For instance, the basic system underlying intelligibility research described in the previous section is of particular importance:

1. Communicator A speaks a word;
2. Communicator B repeats the same word;
3. Test: A + B and a Phonetician (P) all agree the same word was heard twice (go to 5);
4. If all three (A + B + P) do not agree that the same word was heard twice, then A speaks the same word again, B repeats again and the test (in 3 above) is applied again. When A + B + P all agree, then:
5. Communicator B speaks a word;
6. Communicator A repeats the same word;
7. B + A + P all agree the same word was heard twice;
8. . . . etc . . .

Any phonetician can assemble an intercultural dyad, for instance, a Japanese and an American, and instruct the dyad to exchange words on the pattern described above. Regardless of the language used, after twenty or more words and usually within five minutes time, a number of questions of central importance to both phonetic science and intercultural communication will have been raised:

-How interpret when A + B + P all agree that the same word was heard twice?

-How account for the instance where A + B agree and P disagrees? Who is "really" right?

-How account for the instance where B + P agree and A disagrees? More generally, how define an "error" or mismatch?

The list of questions could be very long and the additional entries will be immediately evident to the phonetician who conducts this small experiment. There are, for instance, several types of mismatch or "error" and what the cause is thought to be of each type is of central importance to intercultural communication. Specifically, almost all training in this area assumes the target is for the foreigner to learn to "speak like a native" rather than for the native to adapt his style of communication to the skill level the "foreigner" demonstrates at a particular moment. There are a number of other fundamental implications (7).

Because the application of phonetic techniques within a dyadic system framework to questions in intercultural communication is not yet prevalent, it may be useful to outline some informal probes a phonetician can employ. The simplest "little" study is the one outlined above. Another approach is outlined below.

Our first attempt in 1964 to study what we then called "international communication" was begun with nine intercultural

dyads. Each dyad was composed of two college students, one was a native speaker and the other a second language speaker of English. The dyad members were seated in a small room and asked to talk with each other for about twenty minutes on any topic of mutual interest. We tape recorded the sessions and asked each person to complete a post-communication questionnaire. My collaborator was a linguist (14).

We observed several interesting patterns. Consistently, the native speaker talked more, usually about twice as much as the second language speaker. At the moment when one speaker stopped talking and the other began talking, both often seemed tense. Some of the conversations sounded like a newspaper reporter conducting an interview. Others sounded like a professor tutoring a student. And one conversation that flowed smoothly and was reported satisfying by both participants we were unable to characterize. When errors or misunderstandings occurred, the dyad sometimes gave up trying to "correct" them, laughed nervously, and went on.

In time, we developed short names for these patterns.

-time-imbalance, where the native speaker talks 40 seconds or more and the second language speaker 20 seconds or less per communication minute. This imbalance depends in part on the slower reaction time of a second language speaker as is well known in physiological phonetics and the cultural significance of pause time. The time-imbalance is also associated with three basic patterns in intercultural communication that have been named tutorial,

interview and interchange, and described in detail elsewhere (6, 7).

-switching pause, where one speaker stops talking and the other begins talking. This feature was named by Jaffe and described in detail by him (16). It is especially in need of detailed phonetic analysis because it does not appear in the speech of a single individual. Yet as George Miller noted, it may well be the first Universal of all human communication.

-mismatch analysis, where an error or other unexpected "turn in conversation" results in what is usually called a "misunderstanding." Over time, we developed a simple drawing task that permits the display of the relationship of a particular error and the string of words that was associated with it. We tape recorded a session; and, we used the templates computer programmers employ in the drawings of both members of the dyad and examine the errors made in terms of tape recorded conversation. The patterns that result in drawing errors appear to build up over about a minute and are signaled by small shifts in time utilization and articulation. An error or mismatch when detected by the members of the dyad, may or may not be corrected. Often, they seemed unable to correct an error. Again, there appear to be regular patterns.

The three areas cited above--time-imbalance, switching pause, and mismatch analysis--are of central importance to intercultural communication and all are susceptible to detailed analysis using

the tools of phonetic science providing the dyad rather than the individual is the starting point. It is my hope that these and related questions receive the attention they require from phoneticians around the world.

RIGHT TO COMMUNICATE

In the past two sections, I have tried to show the importance of phonetic science for the growth of intercultural communication. In the past a major contribution of phonetic science has been in the area of language acquisition. In the future, the techniques of phonetic science can also be profitably applied to the analysis of patterns in dyadic communication systems.

As is well-known, one of the central concerns of the United Nations is Human Rights. This concern is expressed in the Universal Declaration of Human Rights adopted in December, 1948. Several of the articles in that Declaration support the idea of a Right to Communicate, in particular Articles 19 and 20 (8).

Today, it is widely recognized that all of us--the nearly four billion of us on this small planet--live in an interdependent world. Many of the problems that face us are, consequently, world problems. The solution of world problems requires, obviously, high quality, large scale intercultural communication. Equally, intercultural communication is often difficult and sometimes impossible.

As I see it, the difficulties in intercultural communication often arise in precisely those areas where phonetic science is

equipped to make a major contribution. I refer in particular to the three areas cited in the previous section: time-imbalance, switching pause, and mismatch analysis. For the consequences that arise from these problems are many. The time-imbalance, whatever its source, makes true dialog all but impossible. The tension that arises around the switching pause is often perceived as a form of cultural aggression. A mismatch undetected or uncorrected often leads to misunderstandings of serious proportions. And there are, of course, other problems of similar scope and importance to intercultural communication that are susceptible to phonetic study (7).

For a while, it has been evident that human development depends on the development of language and communication. In fact, we so often define the human being as Man the Communicator that we no longer notice that we do so. Just now, as we move into a post-industrial, planetary era, the communication requirements of Man have expanded (5). Obviously, intercultural communication has become important to human survival in a way that could not have been predicted in 1750 at the beginning of the industrial era.

In the last few years, it has become evident that men and women everywhere have the Right to Communicate. Yet, it is clear at this time what must be included under such a Right when we consider it from an intercultural or multicultural worldview. The situation we find ourselves in is approximately this: we do not know what the basic communication <u>needs</u> of Man are; for the first time we can now <u>invent</u> whatever communication

technology is required to serve communication needs; and, we can guide the growth of communication policy to ensure that communication technology does indeed serve communication needs. These are new conditions in the world.

At this time, the most urgent requirement is for a specification of human communication needs. Within a dyadic system framework, I believe phoneticians are well-equipped to make a major breakthrough. What is required is to isolate for phonetic study those subsystems which are isomorphic with larger communication systems. This strategy can facilitate identification and clarification of the basic communication needs of Man. On that analysis rests an appropriate growth of human communication resources.

SUMMARY

In the course of this article, I have outlined a number of relationships which are potentially important in a growing science of phonetics. In sum, I have tried to show that when phonetic science is extended from an individual to a dyadic system base, it has far reaching relevance to intercultural communication. And that as it becomes important to intercultural communication, phonetic science also has the potential to make a contribution of the most fundamental importance in the development of a concept of communication needs. Finally, the contribution phonetic science can make in the area of needs can advance the Right of Man to Communicate.

In the years ahead, it is likely that a Declaration of Communication Rights for Mankind will be formulated. Such a

Declaration, it seems to me, will be useful in proportion that it is based on a solid appreciation of the communication needs of Man. Throughout his long career, Professor Onishi has urged that we extend the applications and scope of phonetic science. The time is opportune for us to follow his advice and apply phonetic science to the problems of intercultural communication and, more specifically, to the study of human communication needs.

Everyone has the Right to Communicate.

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